Magnetism and Electricity

We know that , there is a relation between temperature and light.
Also, there is a relation between magnetism and electricity!!!

Where there is :

1 – a magnetic effect of the electric current.
2 – an electric effect of the magnet.

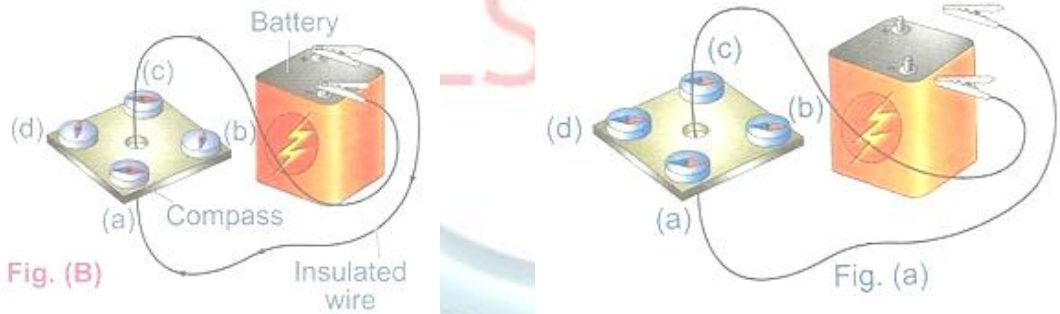
1 – The magnetic effect of the electric

The electric current can generate a magnetic field.

Activity 1 >>> **to show the magnetic effect of the electric current.**

>>> to prove that the electric current can generate a magnetic field.

Materials:



Inference:

The electric current has a magnetic effect, where it generates a magnetic field (magnetism can be gained by electricity).

Generating the magnetic field by using the electric current is th idea of making the electromagnet.

The electromagnet:

It is the magnet which is made by electricity.

Its structure:

It is made up of a copper wire coiling (twisted) around a bar of wrought (soft) iron and this wire is connected to a battery.

Its idea of working:

When the electric current passes through the wire, the bar of the wrought iron works as a magnet.

So,

The electromagnet converts the electric energy into magnetic energy.

Activity 2 ## to show the idea of working of the electromagnet.
to prove that magnetism can be gained by electricity.

Materials:

Inference:

When an electric current passes through a coil winding around a wrought (soft) iron bar, the iron bar becomes a temporary magnet that is called (the electromagnet).

Note

The magnetic force of the electromagnet can be increased by:

a. Increasing the number of coil turns.
b. Increasing the number of batteries, where the intensity of the electric current passing through the coil increases.

Uses of the electromagnet:

The electromagnet is used in

1 – factories to move (lift) the heavy iron blocks as it is used for making crane (big-sized winch).

2 – making many appliances (devices) as:

a. the electric bell b. the electric mixer.
C. the disc drive. d. the television.

How is the electromagnet used for moving up the heavy iron blocks???

1 – the huge electromagnet is hung in a big-sized winch.

2 – the winch depresses the electromagnet over iron to lift them.

Where,

- when the electric current passes through the coil of the electromagnet, it will attract the iron blocks and move them to another place.

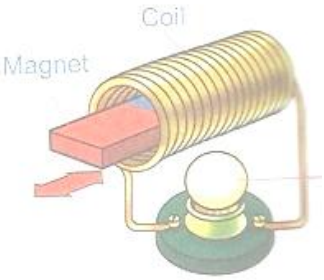
- By cutting the electric current, the electromagnet loses its magnetic force and iron fall.

G.R: **A wrought iron nail is used for making the electromagnet ?**

- because the wrought iron nail gains and loses the magnetism easily.

2 – The electric effect of the magnet.

*In the 19th century, the English scientist **Faraday** discovered that:*



- when a magnet is moved inside a coil of wire, an electric current passes through the coil so, the lamp in the opposite figure lights

this means that the electric energy (electric current) can be generated by a magnetic energy (magnet).

Faraday used this discovery to make an electric generator known as " the dynamo"

The electric generator (the dynamo)

Its structure:

It is made up of :

1 – a copper coil. 2 – a magnet.

Its idea of operation:

It converts the mechanical (kinetic) energy into electrical energy.

Where,

The kinetic energy moves the magnet to produce electricity.

Activity 3 **>>> to show how the electric current is generated by using a magnet**

>>> to know the idea of operation of the dynamo.

Inference:

1 -The electric current can be generated in a coil of dynamo by:

a. moving the coil in the magnetic field (between the two poles of a magnet).
b. Moving a magnet inside the coil as faraday proved.

2 – the generation of the electric current in the coil increases by increasing the motion of coil between the two poles of magnet.

☼Examples on dynamo:

1 – small dynamo in a bicycle. 2 – Huge dynamo.

1 – Small dynamo in a bicycle.

It consists of

- a small cylinder that touches the bicycle wheel tire.
- This small cylinder is connected with a U-shaped (horse-shoe) magnet that is surrounded by a coil.

How does it work?

- when the bicycle moves, the small cylinder turns, because it touches the bicycle wheel tire, so the magnet turns inside the coil.
- By moving the magnet, and electric current is generated in the coil causing the lightening of the bicycle's bulb.

G.R: we must increase the motion of the coil to increase the generation of the electric current.

2 – Huge dynamo (electric generator)

It consists of :

Many great coils that turn between the two poles of a huge magnet.

Its use:

It is used in electric power stations to generate a large amount of electricity used for lightening cities and operating factories.

☼The methods to increase the produced amount of electricity from dynamo.

There are two methods:

1 – by using a strong magnet.

2 – by increasing the number of turns in the moving coils.

Do you know ?

There are three types of electric power stations which are:

1 – Wind electric power stations. >>> use wind energy.

2 – Thermal fuel electric power stations: >>>> use heat energy.

3 – Nuclear electric power stations: >>>> use the nuclear reactors.

Glossary

Electric current	تيار كهربي		Deflect	ينحرف
Generate	يولد		Insulated	معزول
Magnetic effect	تأثير مغناطيسي		Electromagnet	مغناطيس كهربي
Wrought iron	حديد مطاوع		Temporary	مؤقت
Crane	ونش		Intensity	شده
Disc drive	قرص الكمبيوتر		Lift	يرفع
Scrap cars	سيارات الخرده		Depress	يُخفض
Dynamo	مولد كهربي		Discovery	اكتشاف
Convert	يحول		Mechanical energy	طاقة حركيه
Pointer	مؤشر		Cylinder	اسطوانه
Wheel	عجله		Tire	الاطار
Moving coils	الملفات المتحركه		Nuclear	نوويه
Reactors	مفاغلات		Wind energy	طاقة الرياح

Questions on lesson 4

Choose the correct answer:

1 – when the compass is put beside a wire carrying an electric current …….
a. no deflection occurs. b. the compass needle deflects.
c. the compass needle will be destroyed. d. no correct answer.

2 – the magnet which is made by the effect of electricity is called …….
a. natural magnet. b. magnetic substance. c. electromagnet. d. (b) and (c).

3 – the bar used in electromagnet is made up of ……..
a. aluminum. B. wrought iron. C. steel. D. copper.

4 – the electromagnet is composed of ……
a. a copper wire only. B. a bar of wrought iron only. C. a battery. D. a, b and c.

5 – the magnetic force of the electromagnet will be lost by ……..
a. increasing the number of coil turns.
b. increasing the number of batteries.
c. cutting the electric current.
d. switching on the key.

6 – all the following devices have an electromagnet inside them except ……..
a. electric bell. B. television c. disc drive d. refrigerator.

7 –an electric current is generated in a coil of isolated wire when you move a…….. inside the coil.
a. iron bar b. wooden bar. C. bar magnet. d. non-magnetic bar.

8 – the coil of a dynamo is made up of…….. wire.
a. carbon b. copper c. plastic d. graphite.

9 – the dynamo is fixed in the bicycle touching the bicycle's ……..
A . seat b. pedal. C. tire. D. gear

10 – the amount of electricity that is produced from the dynamo can be increased by ……
a. using a strong magnet. b. decreasing the number of turns in the moving coil.
c. increasing the number of turns in the moving coil. D. both (a) and (c).

complete the following statements:

1 – electric current has …….. effect.

2 – the magnet which is made by the effect of electricity is called……

3 – when an electric current flows through a wire twisted around a wrought iron nail, the nail becomes an ……..

4 – the electromagnet consists of …….. , …… and ……

5 – the idea of working of the electromagnet is the changing of energy into …….. energy.

6 – the electromagnet loses its magnetism when ……

7 – the magnet has …… effect.

8 – the basic idea of the electric generator is the changing of energy into ……. Energy.

9 - …….. and ……. Are examples on dynamo.

10 – a huge electric generator is used in …… stations.

My wishes, Mr. Ibrahim Elsayed

للمزيد اضغط هنا